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The twelve forms, which are made a basis, are neither deduced and united into one complete system, nor is the further multiplication deduced. Bruno wrote several works upon this point (*De Sigillis*), the exposition seeming to be different in different works; the main point is that things in their appearing, or as phenomena, are as letters and signs, corresponding to a thought. The general idea, as opposed to the Aristotelian and scholastic dispersiveness, in which each determination was only fixed independently, is certainly to be praised. But in the development of the idea he gets mixed up with the Pythagorean numbers, and is fantastic and arbitrary; in places one comes upon metaphorical and allegorical groupings and couplings, where it is utterly impossible to follow him. In this attempt to reduce everything to order, everything runs together in the wildest disorder.

But it was a great point, in the first place, to get hold of the idea of unity; and it was a great point to view the universe in its development, in the system of its determinations, and to show how the external is a sign of ideas. These two achievements distinguish Bruno in the history of thought.

NOTES AND DISCUSSIONS.

KANT ON THE INFINITE DIVISIBILITY OF SPACE.

[We reprint the following extracts from Professor John Watson's "Kant and his English Critics" (pp. 246-250). His excellent discussion of Kant's "Metaphysical Grounds of Natural Science" we have before alluded to (J. S. P., vol. xv, p. 222). The statement here given is Professor Watson's own summary of the Kantian treatise.—Ed.]

As each part of space is divisible to infinity, so also is each part of matter which occupies space. And the divisibility of matter means the physical divisibility of its parts. Each part of matter may therefore be regarded, like each material body, as a material substance divisible to infinity; for a material substance is definable as that which is movable in itself.

This proof of the infinite divisibility of matter overthrows the theory of the monadists, who suppose matter to be composed of indivisible points, and to occupy space,

purely in virtue of its repulsive force. On this view, while space and the sphere of activity of a substance is divisible, the substance itself, which occupies space and manifests force, is not divisible. But, as has been shown, there is no point in an occupied space which is not capable of being regarded as a material substance endowed with repulsive force, and as itself movable, because capable of being acted upon by other repulsive forces. This may be still further shown in the following way: If we suppose any monad, with a given sphere of activity, to be placed at a certain point; then, as space is divisible to infinity, we can suppose an infinity of monads to occupy a position between the first monad and the point to which its resistance extends. Each of these, as possessed of a force of repulsion of its own, and as repelled by the other, must be movable; and hence, there is no part of space occupied by matter which is not movable; in other words, each part of matter is a substance endowed with a moving force. Matter, therefore, is not indivisible, as the monadist supposes, but infinitely divisible.

Observe, however, that, when matter is said to be divisible to infinity, it is not meant that it is made up of an infinite number of parts, as the dogmatic philosopher maintains. Divisibility is not identical with dividedness. If space and matter were things in themselves, we should indeed have to admit either that matter is composed of a finite number of parts, or that we have no knowledge of it. But when we see that matter in space is not a thing in itself but a phenomenon, we can also understand how it may be divisible to infinity, and yet may not be composed of an infinite number of parts. A phenomenon exists only in relation to our thought of it, and hence matter is divided just in so far as we have carried the division. The mere fact, therefore, that we can carry on the division to infinity does not show that there is in a material body actually an infinite number of parts. Nor can we affirm that the parts of matter are simple, because these parts, as existing only in relation to our consciousness of them, are given only in the process by which they are divided or mentally distinguished. Matter, therefore, is not composed of parts which exist as simple in a thing external to knowledge, but of parts determined as such in the process by which matter is known as divisible.

It has been shown that without impenetrability there could be no occupation of space at all, and that impenetrability is just the capacity by which matter, in virtue of a moving force, extends itself in all directions. A force of extension, however, cannot of itself account for the existence of matter as having a definite quantity. In the first place, there is no absolute limit to extension in such a force itself; and, in the second place, there is nothing in the nature of space to prevent the infinite expansion of matter; for the intensity of the force of extension, while it will no doubt decrease as the volume of matter expands, can never sink down to zero. Apart, therefore, from a force of compression acting contrary to the force of repulsion, matter could have no finite quantity in a given space, but would disperse itself to infinity. Nor can the limiting force of one material body be found in the repulsive force of another material body, since the latter also requires a force of compression to determine it to a finite quantity. Besides the repulsive force with which a body is endowed, we must therefore suppose it to have a force acting in the opposite direction—*i. e.*, a force of attraction. And this force, as essential to the very possibility of matter, cannot be peculiar to a certain kind of material body, but must be universal. Both the force of repulsion and the force of attraction are therefore essential; for, while, by the former, matter would disperse itself to infinity, by the latter it would vanish in a mathematical point. If merely a force of attraction were to act, the distance between each part of matter would be gradually lessened until it disappeared altogether, since one moving force can only be limited by a moving force

contrary to it. These, it may be added, are the only ultimate forces; for as matter, apart from its mass, may be considered as a point, any two material bodies must either separate from, or approach to, one another in the straight line lying between them; and the motion of separation is due to repulsion, the motion of approximation to attraction.

Matter, then, is constituted by the two opposite forces of repulsion and attraction. There is, however, an important distinction between the mode of operation of these forces. Repulsion acts only by physical contact, attraction only at a distance: (1) Physical contact must be carefully distinguished from mathematical contact. The latter is presupposed in the former, but the one cannot be identified with the other. Contact, in the mathematical sense, is simply the limit between any two parts of space, a limit which is not *contained in* either of the parts. Two straight lines cannot in themselves be in contact with each other; but, if they cut each other, they meet in a point which constitutes the common limit between them. So a line is the limit between two surfaces, and a surface the limit between two solids. Physical contact, on the other hand, is the mutual action of two repulsive forces in the common limit of two material bodies, or the reciprocal action constituting impenetrability. Attraction never acts by physical contact, but is always *actio in distans*, or action through empty space. For, as has been shown, a force of attraction is essential to the determination of any given material body as to intensive quantity, and this force must act independently of the physical contact of bodies—*i. e.*, through empty space. To the conception of attraction, as action at a distance, it is commonly objected that matter cannot act where it is not. How, it may be asked, can the earth immediately attract the moon, which is thousands of miles distant from it? To this Kant replies that matter cannot act where it is, on any hypothesis we may adopt, since each part of it is necessarily outside of every other. Even if the earth and the moon were in physical contact, their point of contact would lie in the limit between the two parts touching each other, and therefore each part, to act on the other, must act where it is not. The objection, therefore, comes to this, that one body can only act on another when each repels the other. But this makes attraction absolutely dependent on repulsion, if it does not abolish attraction altogether—a supposition for which there is no ground whatever. Attraction and repulsion are completely independent of one another, and are alike necessary to the constitution of a material body.

SENTENCES IN PROSE AND VERSE.

SELECTION BY W. E. CHANNING.

He took it in his [hand], which was well-formed, thin, and ascetic; its clasp, rarely given, was possessive, not alone of another, but of himself; now it closed around Beth's, until she felt hers unbreakably bound.—*Bethesda by Barbara Elton.*

What is more charming than a glimpse of a scene familiar to us, through a stranger's discerning eyes? Don't we all enjoy a painting better of something we know?—*Ibid.*

They [politicians] crystallize theories into actions, and show the result in a state.—*Ibid.*